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General Notes.

GEOLOGY AND PALEONTOLOGY.

On the Non-Actinopterygian Teleostomi.—Material is not at present accessible in the United States from which to learn the structure of the median fins in the *Holoptychiidæ* and *Osteolepididæ*. In drawing up my Synopsis of the Families of the Vertebrata, in 1889,¹ I assumed that these fins had the primitive structure, such as is found in the oldest members of the Teleostomi (*Tarassiidæ*), *Dipnoi*, and other subclasses, viz., that the axonosts are equal in number to, and continuous with, the neural spines of the Vertebrata. This definition threw the families in question into the *Crossopterygia* as distinguished from the *Rhipidopterygia*. In the latter the axonosts are much reduced in number, so that one or two fused into a single piece supports each dorsal and anal fin.

Prof. Traquair has, however, stated that the dorsal fins of the *Osteolepididæ* are of the *Rhipidopterygian* type, and Mr. A. Smith Woodward in the Volume II. of the Catalogue of Fossil Fishes in the British Museum² confirms this statement, and shows that the *Holoptychiidæ* agree with them in this respect. He does not adopt the super-order *Rhipidopterygia*, but combines it with the *Crossopterygia*; and he places the families mentioned, together with the *Rhizodontidæ*, which is my *Tristichopteridæ*, in the order to which I referred the latter, the *Rhipidistia*. As regards this ordinal reference, it is clearly necessary on the evidence brought forward by Traquair and by Woodward. I do not, however, see that the *Rhipidopterygia* can be properly combined with the *Crossopterygia*, since the structure of the median fins is radically different, and one which offers as good ground for super-ordinal distinction as do the paired fins offer ground for the separation of the *Actinopterygia*. The *Tarassiidæ* and the *Polypteridæ* possess the characters of the median fins which I viewed as characteristic of the *Crossopterygia*, while the paired fins, so far as can be discovered from the descriptions of the former,³ indicate two distinct orders within it.

¹ AMERICAN NATURALIST, p. 856.

² *L. c.*, 1891, p. 321.

³ Smith Woodward, *L. c.*, II., p. 317.

With this new information in our possession, it appears to me that the relations of these fishes is best expressed in the following way:

Subclass IV.—TELEOSTOMI.

There are four superorders of the Teleostomi or true fishes, which differ in the structure of the fins.

- I. Median fins each with a single bone representing axonosts.
Paired fins unibasal ; *Rhipidopterygia.*
- II. Median fins with numerous axonosts.
Paired fins with baseosts ; pectorals with separate axonosts ; ? uni- or pluribasal ; *Crossopterygia.*
Paired fins with baseosts ; pectoral fins with axonosts and baseosts confounded ; pluribasal ; *Podopterygia.*
Pectoral fins only with baseosts, these confounded ? with an axonost, and pluribasal ; *Actinopterygia.*

Rhipidopterygia.

The orders of *Rhipidopterygia* are the following. They all have actinotrichia in place of fin-rays :

- I. Paired fins with the basilar arranged on each side of the median axis, or archipterygial.
Median fins with basilar ; *Taxistia.*
- II. Paired fins with the basilar arranged fan-shaped at the end of short axis.
Median fins with basilar ; *Rhipidistia.*
Median fins without, caudal fins with, basilar ; *Actinistia.*

The *Taxistia* includes but one family, the *Holoptychiidæ*, which is of Devonian age. The *Rhipidistia* includes the *Tristichopteridæ*, from the Devonian and Carbonian ; the *Osteolepidæ*, from the same ; and possibly the *Onychodontidæ*, which are Devonian.

The *Actinistia* includes the single family of the *Cœlacanthidæ*, which appears in the Lower Carbonian and ranges to the Upper Cretacic in both Europe and America.

The *Crossopterygia* includes two orders, as follows :

- Dorsal baseosts and axonosts well developed ; actinotrichia ; no fin-rays ; pectorals ? unibasal ; *Haplistia.*
- Dorsal baseosts rudimental ; fin-rays ; pectorals tribasal ; *Cladistia.*

But one family is included in the *Haplistia*, the *Tarassiidæ*, from the Lower Carbonian of Scotland. The *Cladistia* are represented by a family which is not known in the fossil state, *Polypteridæ*, of the

rivers of Africa. The vertebræ in this genus are ossified and biconcave.

The *Podopterygia* has also two orders. They are thus defined :

Branchiostegal rays present ;

Lysopteri.

No branchiostegal rays ;

Chondrostei.

In these orders the notochord is persistent, and there are either actinotrichia, or fin-rays which are more numerous than the baseosts. Tail heterocercal or diphyrcal.

The location of the *Lysopteri* in the *Podopterygia* by Woodward is due to the discovery by Traquair of the characters of the pectoral and ventral fins. The order includes four families, which differ as follows :

I. Tail heterocercal.

Teeth acute, external ;

Palæoniscidæ.

Teeth obtuse, on palate and splenial ;

Platysomidæ.

No teeth ;

Chondrosteidæ.

II. Tail diphyrcal.

Teeth present ; scuta on body ;

Belonorynchidæ.

The *Chondrostei* include two families, the *Accipenseridæ* and the *Polyodontidæ*, both of which make their first appearance in the Eocene.—E. D. COPE.

Paleontology of Argentina.—A new journal devoted to natural history has just been established by M. Florentino Ameghino, at Buenos Ayres, under the title, *Revista Argentina de Historia Naturel*. In the *Bulletin Bibliographic* is given the titles of the memoirs in the first number. Among the notes will be found the following statements of especial interest to paleontologists :

Two scientific expeditions are now at work in Southern Patagonia. One, under the direction of M. Ramon Lista, governor of the territory of Santa Cruz, which has for its object the geography of the country, left the Island of Pavon November 5th, 1890, in order to explore the lakes of the Andes. The other exploration, which is exclusively geological, under the direction of M. Carlos Ameghino, had for its object the study of geology, and to collect fossil remains in that region. The notes received up to this time (February, 1891) warrant us in stating that the results of this expedition surpass all preceding ones.

Farther north, the oligocene formations in the vicinity of Parana were explored, during the year 1890, by MM. Scalabrini and Léon Lelong, who collected an immense quantity of bones of fossil vertebrates belonging to a type entirely unknown up to this time. A second formation of the same epoch, equally rich in fossil remains, has been discovered at Arroyo del Espinillo, about fifteen miles from the city of Parana. Many of the species are new to science.

Finally, the Miocene sands which form the valleys between the spurs of the Acoquija (Tucuman and Catamarca) have furnished M. Manuel B. Zavaleta with remains of fossil mammals indicating a fauna almost entirely new, and which is badly represented in the formations of the same epoch hitherto explored.

These fossils will be described in the next number of the *Revista Argentina*, as well as the new type of Ungulates named by M. Ameghino *Notohippus toxodontoides*.—*Revue Scientifique*.

Water-Marks on Paleozoic Rocks.—In the *Quar. Jour. Geol. Soc.*, Nov., 1890, Sir Wm. Dawson has figured and described some peculiar markings of Paleozoic rocks. Bilobites, which have been regarded by Saporta, Delgado, and others as true algæ, are, so far as American examples are concerned, undoubtedly the tracks of a marine animal, probably crustacean. Scolithus, originally placed with fucoids, represents burrows of worms with castings at their entrances. Sabelarites is a name the author proposes for certain elongated tubes composed of grains of sand and calcareous organic fragments associated with carbonaceous flocculent matter, indicating a horny sheath. They are formed of the phosphatic dejections of animals subsisting on Lingulæ, Trilobites, Hyolithes, and other creatures having coverings of calcium-phosphate. Certain trunk-like forms in the Potsdam Sandstone are now shown to be concretions, the nucleus of which must have been a Chorda-like alga.

In many cases species of fossil plants have founded on rill-marks, notably the genera *Dendrophycus*, *Delessertites*, and *Vexillum*.

The Mutual Relations of Land-Elevation and Ice-Accumulation during the Quaternary Period are described by Professor Joseph LeConte as follows:

"It is generally agreed that the Quaternary was characterized by remarkable oscillations of land level, and corresponding oscillations of climate and of ice-accumulation. But the most opposite views are held regarding the time-relations of these two sets of phenomena. Some hold that the land-elevation was coincident with the cold and the ice-accumulation, and was at least one of its causes; and that the moderation of temperature and removal of the ice was coincident with the depression, and was its effect. Others take exactly the opposite view. I believe that the two extreme views may be reconciled, and all facts satisfactorily explained, by supposing (1) that the continental elevation which commenced in the Pliocene culminated in the early

Pleistocene, and was at least one of the causes of the cold, and therefore of the ice-accumulation; (2) that the increasing load of ice was the main cause of subsidence below the present level; (3) that the removal of the ice-load by melting was the cause of the re-elevation to the present condition; but (4) that all these effects lagged far behind their causes." (Bull. Geol. Soc. Am., Vol. II., pp. 223-330.)

Submarine Channels of the Pacific Coast.—In a recent paper in the Bull. Geol. Soc. Am., Prof. Joseph LeConte discusses the submarine channels off the Pacific coast. The researches of Professor Davidson have brought to light twenty or more submarine channels on the coast from Cape Mendocino to San Diego. The distinctive feature of these, as contrasted with those on the eastern shore, is that they have no obvious relation to existing rivers. They are not a submarine continuation of any system of river valleys on the adjacent land. On the contrary, they run in close to shore, and abut against a bold coast, with mountains rising in some cases 3,000 feet within three to five miles of the shore-line, and wholly unbroken by any large river valleys. Mr. LeConte thinks it is impossible to account for this except by orogenic changes which diverted the lower courses, and places of emptying of the rivers, since the channels were made. He dates these changes about the end of the Pliocene or beginning of the Pleistocene; they were probably coincident with the lava-flows and consequent displacement of the rivers, which took place at that time in the Sierra region.

Geological News.—Walter Harvey Weed has been working up the geology of the Cinnabar and Bozeman coal fields of Montana. He believes that facts warrant him in stating that these Coal Measures are of Laramie age. They are conformably overlain by volcanic material containing an abundant fossil flora of recognized Laramie types, in turn overlain by beds of fresh-water clays and sandstones of undetermined age, but which belong to what has heretofore been considered as undoubtedly Laramie strata. (Bull. Geol. Soc. Am., Vol. II., pp. 349-364.)—According to E. T. Newton, the rodents now known to occur in the brick-earth of the Thames valley are: *Castor fiber* Linn., *Spermophilus erythrogenoides* Falc., *Microtus (Arvicola) amphibius*, Linn., *Microtus (Arvicola) ratticeps* Key. and Bl., *Myodes torquatus* Desm., and *M. lemmus* Linn. (*Geol. Mag.*, Vol. VII., Dec., 1890.)—According to Mr. Robert Bell, ore bodies of the nickel and copper deposits in the Sudbury (Canada) district do not appear to have been accumulated like ordinary metalliferous veins from mineral

matter in aqueous solution, but to have resulted from igneous fusion. The fact that they are always associated with diorite, which has been left in its present positions in a molten state, points in this direction. (Bull. Geol. Soc. Am., Vol. II., pp. 125-140.)—According to R. Etheridge, Jr., there have been no geologic traces of man discovered in Australia up to the present time. The meagre details in the finds recorded render their evidence untrustworthy. (Proc. Linnean Soc. New South Wales, Vol. V., pp. 259-268.)—Professor von Ettingshausen, the eminent Austrian paleobotanist, has published a memoir on the fossil plants of New Zealand. This work is now being reproduced in English, and will be published with a large amount of additional information upon the same subject. (Rept. Col. Mus. and Geol. Surv. New Zealand, No. 20.)—The annual appropriation for the Geological Survey of Texas, made by the Legislature just adjourned, is \$35,000, exclusive of printing. Appropriations were also made for testing the lignites, for the publication of an accurate map of the state, and for the erection of a laboratory building at the University of Texas, which will contain a suite of rooms for the chemical department of the survey.

BOTANY.

North American Diatoms.¹—Seven years ago the botanists of this country were presented by Mr. Wolle with a handy book on Desmids, and three years later they found themselves again indebted to the industrious author for an equally useful work on the fresh-water Algæ of the United States, exclusive of the Desmids (treated in the previous work) and the Diatomaceæ. We have now the pleasure of noticing a volume on the Diatoms of North America, in which the author completes his series of works on the Algæ.

The plan of the work resembles that of Schmidt's "Atlas der Diatomaceen Kunde," in which figures serve in place of specific descriptions. Any one who has worked with these tiny plants knows full well that a good figure is of much more use in the determination of species than a great deal of descriptive text. The text is useful,

¹ Diatomaceæ of North America. Illustrated with twenty-three hundred figures from the author's drawings on one hundred and twelve plates. By the Rev. Francis Wolle, author of "Desmids of the United States," "Fresh-Water Algæ of the United States." Bethlehem, Pa., The Comenius Press, 1890.